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Animal Genetic Resources and Sustainable Development

Modul no. 2: Conservation and Sustainable Use of Animal Genetic Resources

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Animal Genetic Resources (AnGR)

Definition

- all species, breeds and lines, ...
- of economic, scientific and cultural importance
- for the present and future needs of human society and agriculture

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Animal Genetic Resources (AnGR)

Definition

- genetically unique populations together with their direct, wild ancestors
- created by all domestication processes within each animal species
- used for food production and agricultural purposes

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The importance of AnGR

- preserve all resources for food production and agriculture
- increased demand for animal products
- less efficient breeds are not competitive
- unique
- part of the national heritage, an integrating factor in the heritage of nations
- prevent disease - eradication of breeds

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The importance of AnGR

- **Resources for food production and agriculture**
  - 40 domesticated animal species used for food production and agriculture
  - 8 species (pigs, chickens, cattle, sheep, goats, turkeys, ducks and buffaloes) accounted for 97% of global meat production in 2018, 4 species (cattle, buffaloes, goats and sheep) accounted for almost 100% of global milk production, and chickens themselves accounted for 93% of global egg production
  - in 2020, the FAO registered a total of 8719 livestock breeds
    - 6 % extinct
    - 26 % threatened by extinction
    - 13 % not endangered
    - 55 % with unknown risk status

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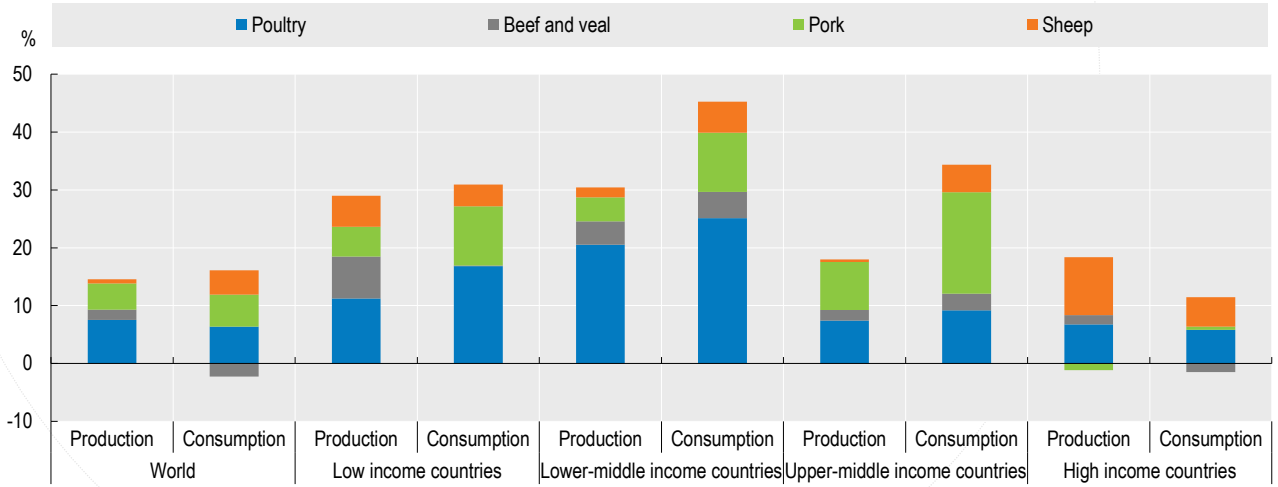
The importance of AnGR

- **Increased demand for products of animal origin**

- by 2030, the growth in global animal protein consumption is expected to increase by 14% compared to the average for the period 2018-2020, mainly due to income and population growth



Expected increase in per capita production and consumption of poultry, beef and veal, pork and sheep meat from 2019-2021 to 2031 (Source: OECD-FAO Agricultural Outlook 2022-2031, OECD, 2022)

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The importance of AnGR

- **Local/autochthonous AnGR populations are unique**

- specifically unique genes

- exceptional, genetically determined production

- genetic distances of the population from other breeds

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Conservation and sustainable development of AnGR

- **Conservation of AnGR**

➢the use and development of animal genetic resources for food production and agriculture in a sustainable way

➢the use of animal genetic resources that already have a high level of adaptability to the production environment (in production systems)

➢the application of sound genetic principles to facilitate the sustainable development of animal genetic resources and the sustainable intensification of the production systems themselves

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Conservation and sustainable development of AnGR

- **Conservation of AnGR**

- covers all human activities, including strategies, programmes and policies
- conserving the diversity of livestock genetic resources in order to contribute to the production and productivity of food and agriculture in the present and in the future

- **Conservation genetics**

- is the theoretical and practical part of genetics in the conservation of species as dynamic parts that are able to change and adapt to environmental changes in order to minimize the risk of their extinction
- ecology, molecular biology, population genetics, mathematical modelling .... theoretical and applied sciences

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Conservation and sustainable development of AnGR

- **In situ AnGR conservation**

- all actions to conserve AnGR populations, including those involved in active breeding programmes in different agroecosystems
- the native environment to which they are well adapted or an environment similar to the native environment
- the aim is to ensure that AnGR will contribute to sustainable food and agricultural production in the present and in the future

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Conservation and sustainable development of AnGR

- **Ex situ AnGR conservation**

the preservation of genetic material through live animals outside their native environment (Ex situ in vivo), or the preservation of genetic material in an artificial environment usually under cryogenic conditions, e.g. cryopreservation of sperm, oocytes, embryos, cells or tissues (Ex situ in vitro)

Gene bank

a physical place for the storage of samples of well-identified genetic material in the form of live animals or genetic material, i.e. in situ (e.g. group of breeding females and sires, herd) or ex situ (stored insemination doses, oocytes, embryos, cells or tissues)

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Conservation and sustainable development of AnGR

History

- 1945 – Establishment of the UN FAO
- 1970 – 1980 - National activities
- 1980 – Establishment of the UNEP Technical Programme
- 1986 – FAO/EAAP breed identification and description programme
- 1987 – Establishment of an international databank in Hanover
- 1990 – Global Programme
- 1992 – United Nations Conference on Environment and Development - Convention on Biological Diversity (Agenda 21)
- 1993 – Global Strategy for the Management of Animal Genetic Resources
- 1996 – Rome Declaration (conservation and sustainable use)
- 2000 – Cartagena Protocol (Biosafety from the perspective of GMOs)

Present state

- 2007 – Global Plan of Action (GPA) for AnGR - Commission on Genetic Resources for Food and Agriculture (CGRFA)
- 2010 – Nagoya Protocol
  - legal framework to regulate access to genetic resources and the fair and equitable sharing of benefits arising from their use in research and development
- Strategic Plan for Biodiversity 2011-2020 Convention on Biological Diversity (CBD)
  - conservation of biological diversity
  - sustainable use of its components and fair and equitable sharing of benefits (ABS) arising from the use of genetic resources and associated knowledge
  - goal 13: Conservation of genetic diversity, including the diversity of livestock and domesticated animals
- Sustainable Development Goals (SDGs) under the 2030 Agenda - UN
  - adopted by all Member States in 2015

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Uchovávanie a udržateľný rozvoj ŽGZ

Present state - EU

- European Biodiversity Strategy
  - a comprehensive, ambitious, long-term plan to protect nature and reverse the degradation of ecosystems. It also stresses the need to support the use of traditional crop varieties and breeds for their conservation and sustainable use
- European Green Deal
  - EU's biodiversity strategy for 2030
  - one of the main strategies is Farm to Fork (F2F) - a new comprehensive approach to how the EU should assess the sustainability of food production systems
- EU Common Agricultural Policy (CAP) and EU Rural Development Policy
  - aim is to help farmers improve their environmental and climate behaviour through a more results-oriented approach, better use of data and data analysis, improvements to existing environmental standards, new voluntary measures and an increased emphasis on investment in green and digital technologies and practices
- Post-2020 CAP
  - new national strategic plans to cover the conservation, sustainable use and development of genetic resources in agriculture
- EU research framework (Horizon Europe)
  - research and development in the field of long-term AnGR management

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Partners:

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Thank you for your attention!

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